

WE CLAIM:

1. An isolated TBX5 protein fragment comprising a translated 5' T-box sequence capable of binding to the major groove of target DNA and lacking a translated 3' T-box sequence capable of binding to the minor groove of target DNA.
2. The TBX5 protein fragment according to claim 1, wherein the protein fragment is derived from a human.
3. The TBX5 protein fragment according to claim 2, wherein the translated 5' T-box sequence comprises approximately amino acids 56 to 100 of SEQ ID NO: 1.
4. The TBX5 protein fragment according to claim 2, wherein the protein fragment lacks the sequence comprising approximately amino acid 125 to the C-terminus of SEQ ID NO: 1.
5. The TBX5 protein fragment according to claim 2, wherein the protein fragment lacks the sequence comprising approximately amino acid 198 to the C-terminus of SEQ ID NO: 1.
6. The TBX5 protein fragment according to claim 1, wherein the translated 5' T-box sequence comprises an amino acid sequence at least about 60% identical to amino acids 56 to 100 of SEQ ID NO: 1.
7. The TBX5 protein fragment according to claim 1, wherein the translated 5' T-box sequence comprises an amino acid sequence at least about 80% identical to amino acids 56 to 100 of SEQ ID NO: 1.
8. The TBX5 protein fragment according to claim 1, wherein the translated 5' T-box sequence comprises an amino acid sequence at least about 90% to about 98% identical to amino acids 56 to 100 of SEQ ID NO: 1.
9. A cloned nucleic acid molecule encoding a TBX5 protein fragment according to claim 1.

10. The nucleic acid molecule according to claim 9 wherein the protein fragment is derived from a human
11. The nucleic acid molecule according to claim 10, wherein the translated 5' T-box sequence comprises approximately amino acids 56 to 100 of SEQ ID NO: 1.
12. The TBX5 protein fragment according to claim 10, wherein the protein fragment lacks the sequence comprising approximately amino acid 125 to the C-terminus of SEQ ID NO: 1.
13. The nucleic acid molecule according to claim 10, wherein the protein fragment lacks the sequence comprising approximately amino acid 198 to the C-terminus of SEQ ID NO: 1.
14. The nucleic acid molecule according to claim 9, wherein the translated 5' T-box sequence comprises an amino acid sequence at least about 60% identical to amino acids 56 to 100 of SEQ ID NO: 1.
15. The nucleic acid molecule according to claim 9, wherein the translated 5' T-box sequence comprises an amino acid sequence at least about 80% identical to amino acids 56 to 100 of SEQ ID NO: 1.
16. The nucleic acid molecule according to claim 9, wherein the translated 5' T-box sequence comprises an amino acid sequence at least about 90% to about 98% identical to amino acids 56 to 100 of SEQ ID NO: 1.
17. An expression vector capable of expressing in a host cell a protein fragment according to claim 1.
18. The expression vector according to claim 17, wherein the protein fragment is derived from a human.

19. The expression vector according to claim 18, wherein the translated 5' T-box sequence comprises approximately amino acids 56 to 100 of SEQ ID NO: 1.
20. The expression vector according to claim 18, wherein the protein fragment lacks the sequence comprising approximately amino acid 125 to the C-terminus of SEQ ID NO: 1.
21. The expression vector according to claim 18, wherein the protein fragment lacks the sequence comprising approximately amino acid 198 to the C-terminus of SEQ ID NO: 1.
22. The expression vector according to claim 17, wherein the translated 5' T-box sequence is capable of facilitating an inhibition of cellular proliferation.
23. A method of inhibiting the proliferation of a cell, the method comprising introducing into the cell a polypeptide comprising a translated 5' T-box sequence of TBX5 capable of binding to the major groove of target DNA.
24. The method according to claim 23, wherein the polypeptide is introduced into the cell by contacting the cell with the polypeptide.
25. The method according to claim 23, wherein the polypeptide is introduced into the cell by expressing in the cell a nucleic acid molecule that encodes the polypeptide.
26. The method according to claim 23, wherein the 5' T-box sequence is a human 5' T-box sequence.
27. The method according to claim 23, wherein the polypeptide lacks a translated 3' T-box sequence of TBX5 capable of binding to the minor groove of target DNA.
28. The method according to claim 23, wherein the cell is a malignant cell.

29. The method according to claim 28, wherein the malignant cell is a carcinoma, osteocarcinoma, sarcoma, osteosarcoma, glioma, melanoma, myxoma, adenoma, or rhabdomyoma-derived cell.
30. The method according to claim 23, wherein the cell is a lung, breast, colon, prostate, kidney, ovary, testes, skin, heart, pancreas, thyroid, adrenal, pituitary, brain, muscle or bone cell.
31. The method according to claim 23, wherein the cell is a metastasized cell.
32. The method according to claim 23, wherein the proliferation is inhibited *ex vivo*.
33. The method according to claim 23, wherein the proliferation is inhibited *in vivo*.
34. The method according to claim 23, wherein the cell is a post-embryonic cell.
35. A method for identifying drug candidates that inhibit the proliferation of a cell, the method comprising measuring the effect of a compound on the proliferation of the cell, wherein compounds that inhibit the proliferation of the cell by an amount at least 10% that of a TBX5 polypeptide comprising a translated 5' T-box sequence capable of binding to the major groove of target DNA are drug candidates.
36. The method according to claim 35, wherein the compounds inhibit the proliferation of the cell by an amount at least about 25% that of the TBX5 polypeptide.
37. The method according to claim 35, wherein the compounds inhibit the proliferation of the cell by an amount at least about 50% that of the TBX5 polypeptide.
38. The method according to claim 35, wherein the compounds inhibit the proliferation of the cell by an amount at least about 75% that of the TBX5 polypeptide.

39. The method according to claim 35, wherein the compounds inhibit the proliferation of the cell by an amount at least about 90% that of the TBX5 polypeptide.
40. The method according to claim 35, wherein the polypeptide lacks a translated 3' T-box sequence capable of binding to the minor groove of target DNA.
41. The method according to claim 35, wherein the proliferation is inhibited *ex vivo*.
42. The method according to claim 35, wherein the proliferation is inhibited *in vivo*.
43. The method according to claim 35, wherein the 5' T-box sequence is a human 5' T-box sequence.
44. A method of stimulating growth of heart cells, the method comprising contacting the heart cells with an antagonist of a 5' T-box sequence of the TBX5 gene or with an antagonist of the amino acids encoded by the 5' T-box sequence.
45. The method according to claim 44, wherein the 5' T-box sequence encodes a protein domain of TBX5 capable of binding to the major groove of target DNA.
46. The method according to claim 44, wherein the cells are myocytes.
47. The method according to claim 44, wherein the cells are fibroblasts, endothelial cells, or cardiac stem cells.
48. The method according to claim 44, wherein the antagonist of the 5' T-box sequence of the TBX5 gene is an anti-sense construct.
49. The method according to claim 44, wherein the antagonist of amino acids encoded by the 5' T-box sequence is a hormone-inducible or drug-inducible dominant negative version of TBX5 protein.

50. The method according to claim 44, wherein the antagonist of amino acids encoded by the 5' T-box sequence is a monoclonal antibody.
51. The method according to claim 44, wherein the growth is stimulated *ex vivo*.
52. The method according to claim 44, wherein the growth is stimulated *in vivo*.
53. The method according to claim 44, wherein the 5' T-box sequence is a human 5' T-box sequence.
54. The method according to claim 44, wherein the heart cells are in a patient who has suffered a heart attack or is affected by a cardiomyopathy.
55. A method of stimulating growth of heart cells, the method comprising contacting the heart cells with an antagonist of the TBX5 gene.
56. The method according to claim 55, wherein the antagonist of the TBX5 gene is a peptide antagonist.
57. The method according to claim 56, wherein the peptide antagonist affects cellular localization of TBX5 including a translated 5' T-box sequence capable of binding to the major groove of target DNA.
58. A method of identifying drug candidates that stimulate growth of heart cells, the method comprising determining whether the compounds bind to TBX5.
59. The method according to claim 58, wherein the TBX5 comprises a translated 5' T-box sequence capable of binding to the major groove of target DNA and lacks a translated 3' T-box sequence capable of binding to the minor groove of target DNA.

60. The method according to claim 59, wherein the translated 5' T-box sequence is a human sequence comprising approximately amino acids 56 to 100 of SEQ ID NO: 1.
61. The method according to claim 60, wherein the TBX5 lacks the sequence comprising approximately amino acid 125 to the C-terminus of SEQ ID NO: 1.
62. The method according to claim 60, wherein the TBX5 lacks the sequence comprising approximately amino acid 198 to the C-terminus of SEQ ID NO: 1.
63. A method of identifying compounds that stimulate growth of heart cells, the method comprising determining whether the compounds act, in the heart cells, as antagonists of a 5' T-box sequence of the TBX5 gene or as antagonists of amino acids encoded by the 5' T-box sequence.
64. The method according to claim 63, wherein the heart cells are myocytes or myocyte stem cells.
65. The method according to claim 63, wherein the growth is stimulated *ex vivo*.
66. The method according to claim 63, wherein the growth is stimulated *in vivo*.
67. The method according to claim 63, wherein the 5' T-box sequence is a human 5' T-box sequence.
68. A monoclonal antibody that binds specifically to an antigenic determinant in a translated 5' T-box sequence of the TBX5 gene.
69. The monoclonal antibody according to claim 68, wherein the 5' T-box sequence encodes a protein domain capable of major groove target DNA binding.